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When one has to examine a case of lateral spinal curvature, he must be prepared to express an opinion as to the prognosis, hence it is very important that one should be thus prepared, for he is sure to be asked, "Will she grow out of it?

Before this question can be intelligently answered, many conditions must be taken into consideration. If the case be one in which rotation and fixation of vertebræ exist, an unreserved opinion in the negative may at once be given, but if the case be one in whom only lateral deviation exists, or complicated by rotation, that can be corrected by extension, a favorable opinion can be given, provided due care and attention to treatment be given. In no instance can it be said that a patient, with a well marked case of lateral curvature, will, untreated, grow out of the deformity.

Probably the prognosis is less favorable when the deformity is due to rickets than in any other class of cases. This one should readily appreciate when the numerous unfavorable circumstances incident to such cases are considered, the tender age of the patients when the injurious effects of rickets are most active precluding any thorough form of treatment and en-

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couraging the rapid development of the deformity. Fortunately, these cases are rare.

Curvatures arising from partial paralysis—anterior polio-myelitis—of the spinal muscles are very unfavorable.

The age of onset is a factor of greatest importance in the prognosis; the later in childhood it is developed, the more favorable the ultimate result.

In considering the clinical history of lateral curvature, it is a well recognized fact that the period of spontaneous arrest is at the cessation of growth.

Sex is an important factor in prognosis; the deformity assumes much more severe and rapid form in girls than in boys, owing to their lack of muscular development and feeble health, often aggravated by disorder of menstruation. Lateral curvature is more common in girls than in boys; from the numerous authorities I have consulted, I find the average proportion is eight girls to one boy. This fact is, to my mind, the strongest argument in favor of gymnastic treatment, to be spoken of at length later.

Condition of general health should always be taken into consideration as a very important factor. Persistent anæmia, chlorosis, disorders of menstruation, all of which are so often found in these poorly developed girls that are victims of lateral curvature, not only aid in the rapid development of the deformity, but prevent, to a great degree, the execution of an active course of treatment for muscular development. The most unfavorable subjects of all are girls in whom ill health is tinged with hysteria. Patients with long, yielding, narrow spines, that can be put into almost any shape,

are very unfavorable subjects when the deformity once gets a start.

Occupation is to be considered always. It was stated above that a very small proportion of boys are afflicted with lateral curvature; when it does occur in boys, it is almost always seen in those that have faulty occupations, those that have to carry heavy weights on their backs or shoulders.

The site of the curvature is a matter of importance; those in the lumbar spine being much less favorable. Curvatures with long radii are much more amenable to treatment than those with short; when the radii are short, there will be an early development of compensating curves which adds to the complexity of the case. More attention should be given to the flexibility of the spine than to the amount of the lateral deviation present; a spine in which the deformity will disappear to a marked degree by suspension is favorable for treatment. When rotation exists, as is evidenced by the altered conditions of the ribs and chest, prognosis is *nil* as to much improvement. A checking of the progress of the deformity here is all that can be hoped for, and this only by most vigorous treatment. One cannot be too careful in noting amount of rotation present before giving his opinion as to prognosis. The test should be thorough suspension of the patient to relieve the superincumbent weight and to have the patient assume the "key-note" position; the latter test enables one to see how much of the deformity the patient can voluntarily overcome, and will show very marked improvement if the vertebræ are not fixed in their distorted position.

The "key-note" position is as follows: "Pa-

tient stands erect and extends the arm corresponding to the conclave side above the head to the extreme limit, while the arm of the cervix side is extended to the right angle to the body." This is really a voluntary self-extension; in spines with very well marked curvatures where no rotation exists, almost as much improvement can be produced as by forcible suspension by means of the Sayre apparatus.

This method of examination should not only be the "key-note" to the conditions of the patient's spine, but should serve as the "key-note" to the treatment. How rational it should seem to one that if a patient can voluntarily overcome by muscular action of weak muscles a certain amount of the deformity, how much more should she overcome by developing these weak muscles that are responsible for the condition. If we reflect for a moment what wonderful muscular developments are accompanied by athletes, we should appreciate what should be expected by developing weak muscles.

While it was not intended that this paper should depart from its text—Prognosis and Treatment of Lateral Spinal Curvature—a few words on an etiological factor of such great importance as lack of muscular development surely will not be much out of place, as it is in such close relation to the treatment. The fact that lateral curvature is eight times more common in girls than in boys, is very significant that lack of muscular development is by far the most important etiological factor in this deformity. When one considers how very different are the customs, amusements, games, etc., of a boy from those of the average girl, it is readily understood why there is such a dif-

ference in their muscular developments. The nearer a girl approaches a boy in her amusements, the more athletic her games will be and the less likely she will be to have lateral curvature. My observation has led to believe that spinal curvature is confined to city-bred children; I have not seen a case of this deformity in a girl that has been reared in the country where children spend most of their time out of doors; such children almost always adopt amusements of a most decided athletic nature, such as horse-riding, long walks, games of tennis, croquet, etc. In my native section of the country it is exceptional to see a girl that has not learned to row a boat, and I know of no form of athletic exercise that is better calculated to develop spinal muscles than rowing with the oars; in fact, this exercise will develop every muscle in the body, the forced expansion of the lungs thereby being a most excellent feature.

It was stated above that the more like a boy a girl is the less likely she is to have spinal curvature; this statement is based on the observation of many cases. It is a well recognized fact, that when girls have brothers near her own age she finds, as a rule, their amusements very congenial, causing them to lead much more of an out door life than they would do otherwise, and as a rule such girls have much better muscular developments than the average girl. In looking over my case-book, I find that in thirty cases, with but five exceptions, these patients are girls that either had no brother or none near their own age. Four of my worst cases were cases of a single child of a widowed mother; these children had been

kept constantly at school and having their mothers as their playmates.

In a recent issue of *Pediatrics*, March 1st, 1898, there is an excellent editorial on the subject of "Physical Training of Children." It sets forth in very forcible language the importance of this subject in our schools. It is with great satisfaction that we note of late years that systems of athletic exercises are being established in the public schools for the development of childrens' bodies as well as their minds; and if proper attention is given by competent instruction in the schools, it will surely tend to reduce the number of lateral curvature patients. The author of the editorial above referred to quotes from the report of the director of the physical training in the public schools of Washington, D. C., the following significant language: "It is impossible to test the full measure of success or failure of our efforts. It is in the remote future with school days long past that the lasting influence of such work will be felt by the individual child. That the bodies of our children are better formed, better carried, and more gracefully used there is no doubt. I wish to insist in urging systematic daily medical instruction as a means of improving the physical condition of the child and reducing the possibility of contagion. It needs the critical eye of the medical expert to detect cases of nervous disorders, low nutrition and diseases in their incipient stages."

I wish to add that it is a matter of greatest importance that these children should have their spines subjected to the closest inspection to detect incipient lateral curvature, for in the early recognition of these troubles rest our hopes of curing them, or, at least, of prevent-

ing their further development. "As the twig is bent the tree is inclined," is surely a proverb applicable here.

The conclusion that one should reach as to the prognosis is, first: that it depends more upon the amount of rotation present than to the extent of the curvature; secondly, curvatures submitted to treatment early, even when quite pronounced, may be corrected in large majority of cases, provided the patient's health remains good and you can secure their hearty co-operation throughout the entire course of treatment. The treatment, to be efficient, must be continued for a long time, and the patient must enter into it with heart, soul and body. The trouble being simply a distortion of growth and not a disease that threatens the life of the patient, who becomes accustomed so gradually to her deformity, it is often a difficult matter to get them sufficiently interested in the treatment to carry it out conscientiously. This, of course, is not much the case with older girls.

It is a great mistake to think that little can be done to improve the deformity in these cases; on the contrary, a great deal can be done, if taken in time; and by this, I mean before the spinal column becomes fixed in a distorted position. As long as the spine is *flexible*, a great deal can be done in way of improvement; at any rate, the progress of the deformity should be checked, for just as long as the spine is flexible, it is going to increase until it becomes fixed; hence one should aim to have it become fixed in best possible position.

The treatment of lateral curvature should be considered from two standpoints, viz.: preventive and curative. Children should be instructed how to carry themselves and to avoid

all faulty positions that will throw extra strain on the muscles of one side of the spine to the disadvantage of the other side. Excessive use of the right arm should be avoided; note the fact that nearly every case of lateral curvature is to the right side. Faulty positions in writing should be corrected, and above all, bad positions in sitting; especially should this be looked after in school children, whose chairs and desks should be so constructed as to give greatest possible support to their spines. Nothing is more prolific in the production of spinal curvature than long piano practicing, on an ordinary piano-stool. It seems almost impossible to impress upon the laity the fact that the use of stiffened corsets, by preventing normal action of the spinal muscles, will aid in the production of this deformity.

Faulty positions in children during sleep should be looked after by their parents; children should not be allowed to sleep all of the time on one side; supine position with no pillow is best position for sleeping child. When there is deformity, the child should sleep on the side of the concavity, for in this way the muscles of that side are put on a stretch which in turn will correct a certain amount of the convexity on the opposite side.

In all of the old text-books it is stated that the treatment should consist of spinal braces and gymnastic exercises, making the latter secondary. At present all of the authorities are recommending just the opposite; in fact, the most eminent authorities condemn mechanical supports as being positively injurious in the early stage.

Mr. Bernard Roth, of London, in a paper entitled "Cases Illustrating the Absurdity of

treating Ordinary Lateral Curvature (Scoliosis) by Spinal Supports," read at a recent meeting of the American Orthopedic Association, condemns mechanical supports as being absurd, and, in support of his view, reported a large number of cases treated exclusively by gymnastic exercises with perfectly satisfactory results. He favors daily exercises of the most vigorous kind for the rapid development of the weak muscles. He never uses spinal supports except in severe cases of infantile paralysis of the erectoræ spinal muscles, where, by no voluntary muscular effort, the patients can place themselves in an improved posture.

Dr. Jacob Teschner, of New York, in an article recently published in "Annals of Surgery," says: "Objection to all supporting appliances is, that each and every one will, to a greater or less extent, interfere with the mobility of the spine, and in that manner deprive back, chest and abdominal muscles of that perfect freedom of action which is a necessary and powerful adjunct in the successful treatment of deformity; the aim is and has been to correct the deviations from the normal by such exercises as will educate the different groups of muscles to sufficient and proper exertion to enable the patient to assume as nearly as possible a normal attitude. This muscular education is dependent upon strength and development, without both of which we must largely fail to obtain that proper and vigorous muscular action upon which any beneficial result from corrective exercises must depend. Therefore, it is necessary and imperative, in all cases which require or are amenable to treatment to attain the highest type of development possible of the entire body, to render the spine mobile

in all directions, and also to develop the full strength of each patient. Individual work only can accomplish this end, because it is of the highest importance to carefully watch every movement of the patient, and to immediately correct any and all errors in attitude, deportment and exercise."

One could not possibly give worse advice to a patient with an incipient lateral curvature than to advise her to take a course of exercise in a gymnasium, or institute of physical culture. The surgeon should personally train the patient to do such exercises as are best suited for each individual case and not trust them to an athlete in a gymnasium who knows nothing of the anatomy of the spine. Improper exercises are just as powerful a factor to do harm in such cases as proper exercises, carefully and systematically given, are to do good. Physical culture institutes are very good to prevent the occurrence of lateral curvature by developing the whole muscular system, but patients with incipient curvatures are not fit subjects for such institutions.

Before beginning a course of treatment one should make very careful notes as to the condition of the patient, for if accurate measurements are not made at that time it is very easy to be deceived as to any improvement. There are many systems of measurements in vogue for this purpose, all of which are more or less accurate, and serve the purpose well, if care is taken in following them out. The writer has found the following method very useful and accurate: First mark with a dermatograph pencil the spinous processes, have the patient assume the key-note position, then stretch a cord from tip of the coccyx to the seventh cer-

vical vertebra, and note the point of greatest variations of the spinous processes from this cord. It is unfair to the patient to take such measurements without having her to assume the best voluntary position; of course notes should be made of both positions. Note the distance of the angles of the scapulæ from this cord; with a lead tape take a tracing of the chest at the point of greatest deformity; this should be done with patient bending forward as far as possible with feet and knees together in a line with the vertical axis of the body.

It is not the intention of the writer to give a detailed account of the exercises which should be used to carry out the method of treatment he has been advocating in this paper, for nothing could be gained by it, as he has nothing original to offer in this line. The literature on this subject is very abundant, from which any one interested in the subject can select such exercises as he thinks best suited for each individual case.

There are one or two points that should receive special attention, as they are applicable to every case that offers anything in the way of improvement—viz: Suspension, thorough self-suspension, such as assuming the key-note position in the most vigorous manner, and forcible suspension by means of the Sayre apparatus. This attitude expands the chest as the working of a pair of bellows, and at the same time stretches the faulty spinal muscles as well as those attached to arms and forearms. This is in reality an exaggeration of Sylvester's method of resuscitation. Faradism and massage are most excellent adjuncts to the gymnastic method of treatment; best to apply them immediately after the exercises.

My method of treating these cases is to drill the patient in the exercises at my office at once on alternate days, and at the end of two weeks have them do them every day for a week or ten days.

It is then insisted that the exercises be continued at home, doing them night and morning, having the patients make them a part of their toilet. This should be done for several years in the average case, having patient to call to be examined and remeasured every two or three months, which will enable you to see whether the deformity is increasing or decreasing. I begin my patients with one-pound dumb-bells, and have them increase the weight as the muscles are developed, always using the heaviest that do not produce very much fatigue.

This paper would be incomplete without a few words about use of spinal supports. There are cases of weak and painful spines that have to be supported with braces for the comfort of the patient, but these supports should in no way be considered a part of the treatment, and should be worn just as little of the time as possible. There are cases that require braces for cosmetic effects; these are old cases, with prominent deformities, that have become fixed in their distorted positions. By properly constructed braces, very prominent deformities can be almost entirely disguised.

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